CLAIMS:

1. Method for reducing the number of bits of a digital input signal (M_i) comprising the steps of

adding a pseudo-random noise signal (N_a) to the digital input signal (M_i) to obtain an intermediate signal (D_i), the pseudo-random noise signal (N_a) being defined by noise parameters (N_p); and

quantising the intermediate signal (D_i) having a word length of n bits to a reduced word length signal (M_e) having a word length of m bits, n being larger than or equal to m,

characterised in that

the step of quantising the intermediate signal (D_i) comprises a first transfer function which is non-linear, the first transfer function being defined by non-linear device parameters (NLD_p).

2. Method according to claim 1, in which the quantisation step of the first transfer function for small amplitudes is smaller than the quantisation step for large amplitudes.

3. Method according to claim 2, in which the gain of the first transfer function is substantially equal to one for small amplitudes and in which the gain decreases for large amplitudes.

4. Method according to claim 3, in which the first transfer function equals the function $M_e/D_i = c_1 \tanh(c_2 D_i + c_3)$,
in which M_e is the reduced word length signal, D_i is the intermediate signal and c_1, c_2, c_3 are the non-linear device parameters (NLD_p).

5. Method according to one of the proceeding claims, in which the amplitude of the noise signal (N_a) is at least equal to a predetermined noise value.

6. Method according to one of the proceeding claims, in which noise shaping techniques are applied to obtain the noise signal (N_a).

7. Method according to one of the proceeding claims, in which the reduced word length signal (M_e), the non-linear device parameters (NLD_p) and/or the noise parameters (N_p) are recorded on a recording medium (13).

8. Method according to claim 7, in which the recording medium (13) is a compact disc and the reduced word length signal (M_e) is recorded on a first channel and the non-linear device parameters (NLD_p) and/or the noise parameters (N_p) are recorded on a second channel, the first channel and second channel being separate channels.

9. Method according to one of the proceeding claims, comprising the further step of providing a difference signal, the difference signal being equal to the intermediate signal (D_i) minus the reduced word length signal (M_e).

10. Method for recovering an output signal (M_o) from a reduced word length signal (M_e) provided by the method according to one of the claims 1 through 8, comprising the steps of

quantising the reduced word length signal (M_e) having m bits to a decoded signal (M_d) having n bits, the quantising being defined by a second transfer function and the second transfer function being the inverse of the first transfer function.

11. Method according to claim 10, further comprising the step of subtracting a subtraction noise signal (N_s) from the decoded signal (M_d) in order to provide the output signal (M_o), the subtraction noise signal (N_s) being substantially equal to the noise signal (N_a).

12. Signal processing apparatus, comprising a pseudo-random noise generator (12) for generating a noise signal (N_a) being defined by noise parameters (N_p), an addition element (11) connected to the noise generator (12) for adding the noise signal (N_a) to an digital input signal (M_i) to provide an intermediate signal (D_i), and a first quantising element (10) connected to the addition element (11) for transforming the intermediate signal (D_i)

having a word length of n bits into a reduced word length signal (M_e) having a word length of m bits, n being larger than or equal to m, characterised in that

the quantizing element (10) has a non-linear transfer function, the non-linear transfer function being defined by non-linear device parameters (NLD_p).

13. Signal processing apparatus according to claim 12, in which the signal processing apparatus is arranged to execute the method according to one of the claims 1 through 9.

14. Signal decoding apparatus for recovering an output signal (M_o) from a reduced word length signal (M_e) provided by the signal processing apparatus according to claim 12 or 13, comprising

a second quantisation element (14) having a second transfer function for transforming the reduced word length signal (M_e) into a decoded output signal (M_d), the second transfer function being the inverse of the first transfer function.

15. Signal decoding apparatus according to claim 14, further comprising a second noise source (16) for providing a subtraction noise signal (N_s) to a subtraction element (15), the subtraction noise signal (N_s) being substantially equal to the noise signal (N_a), the subtraction element (15) being arranged for subtracting the subtraction noise signal (N_s) from the decoded signal (M_d) in order to provide the output signal (M_o).